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(71) Applicant
Myllykoski OY (Finland),
46800 Myllykoski, Finland

(72) Inventors
Eero Nurmi
Tuomo Puujalka
Usko Uotila
Pertti Mandelin

(74) Agent and/or Address for Service
T Z Gold & Company,
9 Staple Inn, London WC1V 7QH

(54) Moistening paper webs

(57) Paper webs are moistened during supercalendering by means of steam using a box-like envelope (3) confining a steam space (4). A steam distributor (5) conducts steam into the steam space and a condensation water eliminator (6) removes condensation water from within the envelope. A steam guide border (7) confines the part of the steam space (4) which is open towards the web (2), on one hand joining the envelope (3) in pressure-sealed fashion and on the other hand constituting a margin (8) and a dragging border (9) to be disposed against the web so that the envelope with its steam guide border and the moving web, together, form a positively sealed steam space.

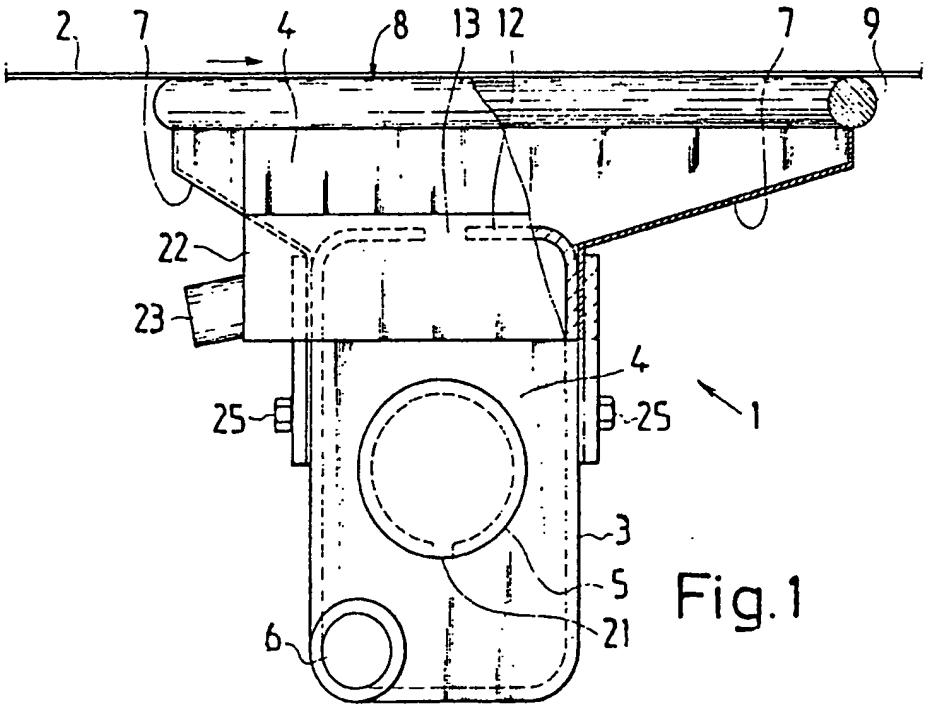

Fig.1

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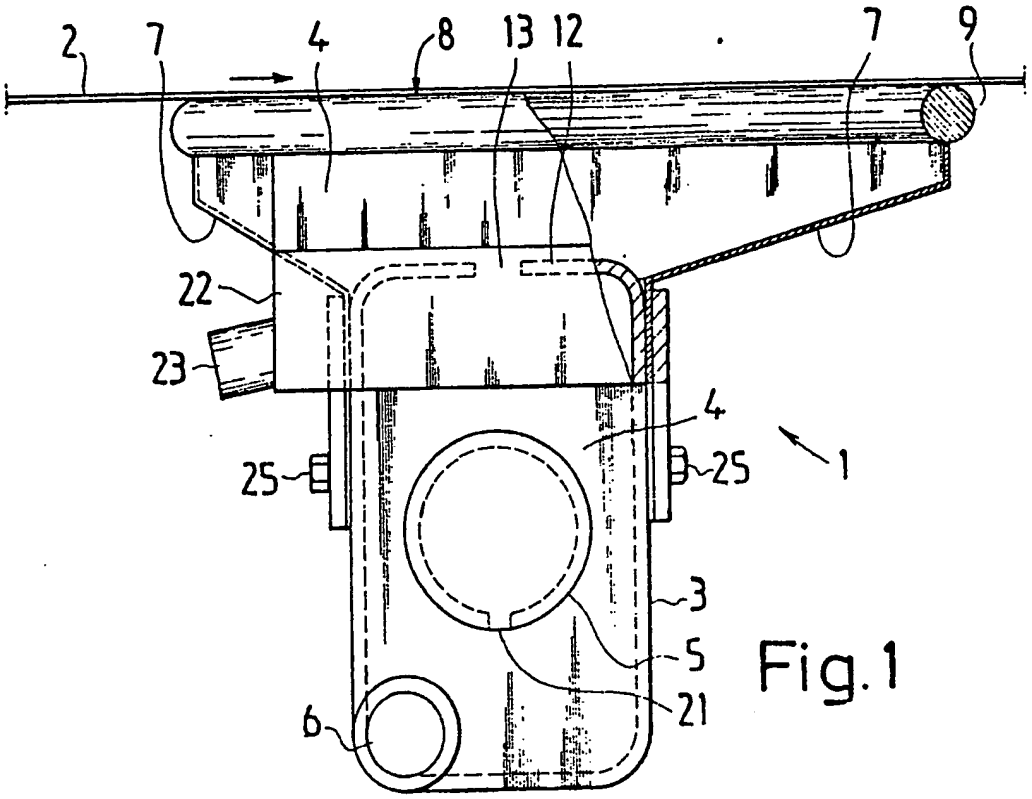
2
7
4
8
13
12
7
9
22
23
4
1
25
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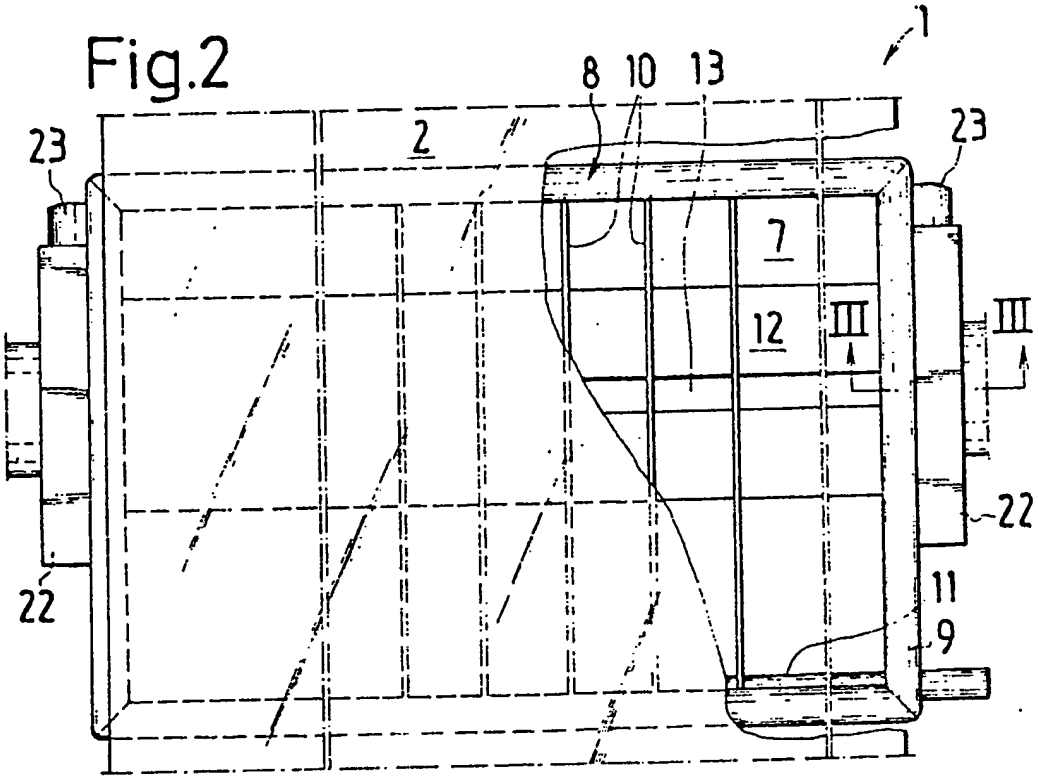
3
5
21
6

Fig.1

Fig.2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III
III
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11
9

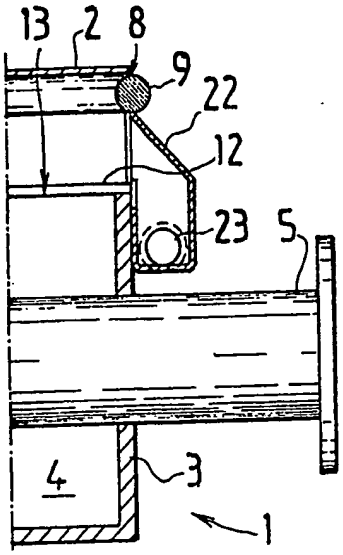

Fig. 3

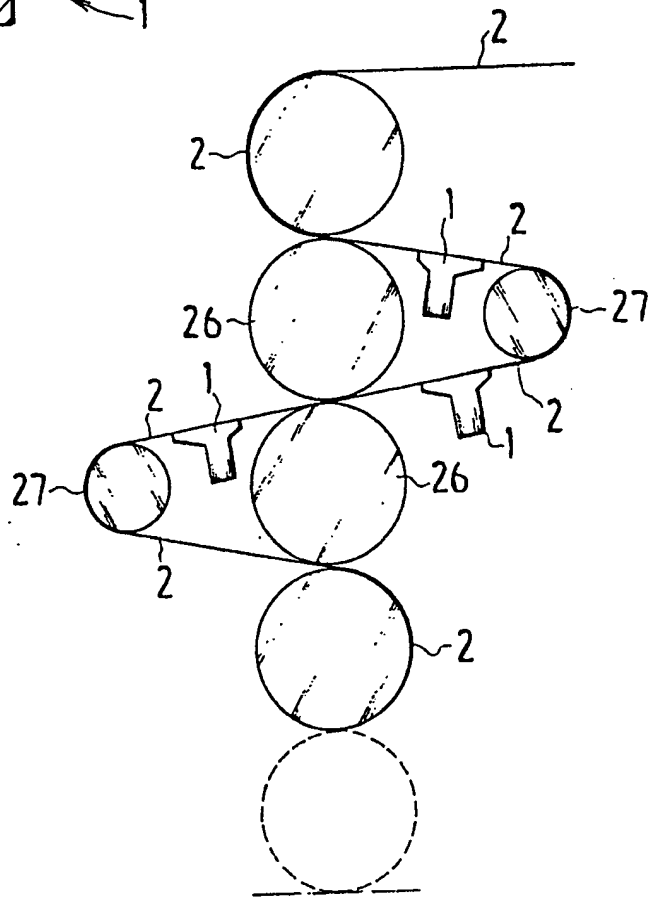

Fig. 4

SPECIFICATION

Moistening means

The present invention concerns a moistening means as has been defined in the preamble part of claim 1. In particular the invention concerns a moistening means for use in the treatment, and especially the supercalendering, of a paper web.

To a paper web to be burnished by the aid of supercalendering, moisture is added at the calender rolls. The moisture is added in the form of steam, employing for instance a moistening means of the type presented above. For adding moisture to the web, it is present practice to dispose the moistening means at a distance from the web or the roll, the distance being on the order of 10–20 cm.

However, the moisture added to the paper in conjunction with super-calendering causes the filler material and coating material contained in the paper to become detached and to stick to the rolls. The filler material detached from the surface of the paper further tends to cake on the surfaces of the rolls in scale-resembling clods which after becoming detached from the rolls are transferred onto the paper, thereby lowering the quality and usability of the paper. The problem caused by the scaling and caking of filler and coating materials is serious particularly at paper rolls, and it restricts considerably the use of steam in conjunction with calendering.

The object of the present invention is to eliminate the drawbacks mentioned above. In particular, the object of the present invention is to introduce a moistening means which does not cause any scaling and caking of the filler materials of the paper as mentioned in conjunction with supercalendering. Furthermore, the object of the invention is to provide a moistening means which is more effective and has a substantially higher efficiency than any moistening means of prior art.

As to the characteristic features of the invention, reference is made to the claims section.

The invention is based on the fundamental idea that the steam space confined by the envelope of the moistening means, with its guide borders, and the web moving against these borders form, in combination, a substantially tightly sealed steam space. In trial runs that have been carried out, a moistening means of this kind has displayed excellent characteristics in comparison with moistening means of prior art. The moistening means does not cause any harmful scaling and caking of the filler material on the rolls of the supercalender, and therefrom on the paper, when the moistening means of the invention is used. Thus, when the moistening means of the invention is used, steam may be used in conjunction with super-calendering in desired quantities without incurring any harmful side effects from the steam. The moisture content of the paper may then be regulated to be as desired, while the paper being produced is substantially better in quality than earlier. Furthermore, when the moistening means of the invention is being used the need of cleaning and servicing the rolls of the supercalender, in particular the need of grinding, will be less. In addition, when the moistening means of the invention is used the need of steam for moistening is substantially reduced, in trial runs performed up to 30% of what it used to be.

The invention is described in the following in detail by the aid of embodiment examples, reference being made to the drawings attached, wherein:–

Figure 1 presents in end view and partly sectioned a moistening means according to the invention,

Figure 2 presents a partial view of the moistening means of Fig. 1, viewed from above the web,

Figure 3 presents the section along the line III–III in Fig. 2, and

Figure 4 presents the moistening means of Figs. 1–3, disposed in conjunction with one take-off of a supercalender.

In Fig. 1 the moistening means 1 has been placed in conjunction with the moving web 2, immediately thereunder. The moistening means 1 comprises an envelope 3 resembling a box, confining an elongated steam space 4 placed transversally to the web. In the figure, the web 2 moves from the left to the right at right angles against the plane of the drawing, and the elongated and box-like moistening means will be perpendicular against the plane of the drawing. Furthermore, the moistening means 1 comprises a steam distributing means 5 for conducting steam inside the envelope 3, into the steam space 4. The steam space 4 is open in the direction towards the web 2 for conducting steam into the web from within the envelope 3.

As taught by the invention, the moistening means 1 depicted in Fig. 1 comprises a steam guide border 7 which confines the part of the steam space 4 which is open towards the web 2. The steam guide border 7 joins on one hand with a pressure-tight seal the envelope 3, and on the other hand it forms a margin 8 to be placed against the web 2 in such fashion that the envelope with its steam guide border and the moving web together form a substantially tightly sealed steam space when the moistening means has been placed against the web, with the edge of the steam guide border against the web. Therefore, the steam space confined by the moistening means and the web is pressurized, thus differing from moistening means of prior art, and the steam conducted into the steam space constitutes a steam cushion against the web.

The steam space 4 carries a pressure higher than atmospheric, and the steam cannot escape in any worthwhile degree through the contact line of the margins 8 and the web.

In the embodiment depicted in Figs. 1–4, the envelope 3 resembles a box, and the envelope constitutes the walls of the steam space 4. In the wall 12 of the steam space on the side of the web, one or more apertures 13 have been made, e.g. a line of apertures or an elongated aperture 13, for conducting steam from the steam space into the web. In cross-section, the envelope 3 is mainly rectangular as viewed from one end, i.e., in the direction of the web from beside the web 2. The steam guide borders 7 project on one hand obliquely in the incoming direction of the web towards the web on the incoming side of the web, and on the other hand obliquely in the outgoing direction of the web towards the web on the outgoing side of the web. The steam guide border 7, produced as a separate box-like part, has been fixed with fixing screws 25 to the side walls of the envelope, upon them. The wall 12 of the envelope 3 facing the web 2, which has been provided with steam apertures 13, forms a partition between the steam space and the web 2. The steam guide means 7 with the dragging border 9 of the margin 8 thereof, such as a round steel, a tube or a flange border, has substantially rectangular shape as viewed in the direction of the web 2 and extends across the web from one margin thereof to the opposite margin, Fig. 2.

The steam guide means 7 is shaped like a collar and connects the steam space 4 of the envelope 3 with substantially tight pressure sealing with the surface of the web 2. The margin 8 of the steam guide border 7 to be placed against the web 2 is advantageously substantially planar.

In Fig. 1 is shown the condensation water eliminator 6 of the envelope 3, that is, a discharge duct for removing the water condensed inside the envelope. Furthermore, in Figs. 1–3 are shown box-like condensation water collecting means 22 with condensation water eliminators 23, such as discharge ducts, for collecting and removing the condensation water accumulating inside the steam border, between the web 2 and the envelope wall 12 facing the web.

In Fig. 2 are shown grille-resembling guides 10 placed inside the steam guide border, across the part of the steam space 4 facing the web 2, for assisting the end of the web over the steam space at start-up.

In Fig. 4 is shown the placement of the moistening means 1 between the topmost calendering roll 26 of the supercalender and the lead-out roll 27 disposed opposite this roll. If desired, the moistening means of the invention may also be used in conjunction with paper-making elsewhere than in the supercalender, e.g. at the ultimate end of the paper machine, in the paper re-treatment, etc. Furthermore, the shape or the moistening means may vary greatly from the one presented in the embodiment example, and the cross-section of the envelope 3 may be e.g. round, square, oval, etc. Furthermore, the steam guide means 7 may consist for instance of the sides of the envelope 3 pointing towards the web 2, of the side walls of the envelope, of a separate border belonging to the envelope, etc.; the moistening means may then comprise a steam space wall 12 with steam apertures 13 on the side of the web 2 like that depicted in Figs. 1–3, or the steam space 4 of the envelope may open directly against the web 2, without said partition. Furthermore, the steam distributing means 5 may consist in conventional fashion of a steam pipe with apertures opening into the steam space 4, the latter disposed for instance, as known in the art, away from the web 2 (Fig. 1), sideways, or e.g. in the direction towards the web.

The embodiment example is intended to illustrate the invention, and the embodiments of the invention may vary.

CLAIMS

1. Moistening means (1) for moistening a moving web (2), said moistening means comprising: a box-like envelope (3), confining an elongated steam space (4) placed transversally with reference to the web; a steam distributing means (5) for conducting steam into the envelope, into the steam space; and a condensation water eliminating means (6) for eliminating the condensed water from within the envelope, the steam space being open towards the web for conducting steam into the web from within the envelope, characterized in that the moistening means (1) comprises a steam guide border (7) confining the part of the steam space (4) which is open towards the web (2), joining on one hand the envelope (3) with press-tight seal and on the other hand constituting a margin (8) to be so placed against the web that the envelope with its steam guide border and the moving web together form a substantially tightly sealed steam space.

2. Moistening means (1) according to claim 1, characterized in that the steam guide border (7) pushes on one hand in the incoming direction of the web (2) and on the other hand in the direction of travel of the web.

3. Moistening means (1) according to claim 1 or 2, characterized in that the margin (8) to be placed against the web (2) of the steam guide border (7) is provided with a dragging border (9), such as a round steel, a tube or a flange edge.

4. Moistening means (1) according to any one of claims 1–3, characterized in that the margin (8) against the web (2) of the steam guide border (7) is substantially planar.

5. Moistening means (1) according to any one of claims 1–4, characterized in that inside the envelope (3), across the part of the steam space (4) which is open towards the web (2), have been placed grille-like guides (10) for assisting the end of the web over the steam space.

6. A moistening device substantially as hereinbefore described in connection with and as shown in Figs. 1 to 4 of the accompanying drawings.

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